

## CHARACTERIZATION OF THE STRUCTURE FOR MEDICATION PREPARATION IN TEACHING-HOSPITALS: FACTORS THAT INTERFERE WITH THE QUALITY OF CARE

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*This article describes the physical environment, material and human resources of the structure for the preparation of medicaments. It is an exploratory descriptive study. Data were collected through scripts structured for observation and interview carried out with a sample of 92 (76%) nurse auxiliaries and all nurses of, two hospitals in Recife, PE, Brazil. Results showed that the environment in which medication is prepared is in disagreement with current legislation, the available materials need to be reviewed and professionals need to get their knowledge updated. It is concluded that the structure in the system of medication is essential and the factors pointed out in the study interfere with the quality of the process of medication.*

**DESCRIPTORS:** health facilities, human resources, manpower; organization and administration; therapeutics; nursing

## CARACTERÍSTICAS EN LA ESTRUCTURA PARA LA PREPARACIÓN DE MEDICAMENTOS EN HOSPITALES DE ENSEÑANZA : FACTORES QUE INFLUYEN EN LA CALIDAD DE LA ASISTENCIA

*Este artículo describe la estructura de preparación de medicamentos en su ambiente físico, recursos materiales y humanos. Se trata de un estudio exploratorio descriptivo. Los datos fueron recolectados por medio de guías estructuradas tanto para la observación y entrevista, las cuales fueron aplicadas en 92% y 76% de los auxiliares de enfermería y en el 100% de los enfermeros de dos hospitales de Recife, PE. Los resultados muestran que el ambiente de preparación de medicamentos no está de acuerdo con la legislación vigente, considerando que los materiales requieren ser revisados y los profesionales capacitados. Se concluye que la estructura dentro del sistema de medicación es esencial y que los factores señalados influyen en la calidad de tal proceso.*

**DESCRIPTORES:** instituciones de salud; recursos humanos; organización y administración; terapéutica; enfermería

## CARACTERIZAÇÃO DA ESTRUTURA PARA O PREPARO DE MEDICAMENTOS EM HOSPITAIS DE ENSINO: FATORES QUE INTERFEREM NA QUALIDADE DA ASSISTÊNCIA

*Este artigo descreve a estrutura do preparo de medicamentos em seu ambiente físico, recursos materiais e humanos. Trata-se de estudo exploratório e descritivo. Os dados foram coletados por meio de roteiros estruturados para observação e entrevista, aplicados em amostras de 92 e 76% dos auxiliares de enfermagem e 100% dos enfermeiros, em dois hospitais na cidade de Recife, PE. Os resultados mostraram que o ambiente do preparo de medicamentos se encontra em discordância com a legislação vigente, os materiais disponíveis precisam ser revisados e os profissionais necessitam de capacitação. Concluiu-se que a estrutura em um sistema de medicação é essencial e que os fatores apontados interferem na qualidade do processo de medicação.*

**DESCRIPTORES:** instituições de saúde, recursos humanos; organização e administração; terapêutica; enfermagem

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## INTRODUCTION

**T**echnological changes exerted a strong influence on health care. These changes are reflected in the constant search for quality, a tendency imported from large industries which starts to take over the health industry as well. The need to change the health scenario is prompt by the expectations of professionals, clients and society in general. The paradigms that guided the administration of health institutions no longer fit in the advancements achieved in this new millennium, and quality has become imperative<sup>(1)</sup>.

It is understood that the improvement of care occurs through the evaluation of health services, which therefore need criteria and established patterns. The criteria and patterns currently used in health institutions going through accreditation processes follow an evaluation model that is based on the quality aspects: structure, process and results, defined by Avedis Donabedian<sup>(2)</sup>.

This evaluation model is based on general systems theory and on the work of Mindel Sheps. Thus, structure, process and results compose a systemic model and form an interdependent chain with a narrow mutual cause-and-effect relation. In this context, the structure is composed of a building, human resources (quantity, category and professional qualification), organizational structure, material resources and normative instruments<sup>(2)</sup>.

The structure is, therefore, one of the essential aspects when attempting to know the functioning of the hospital system or subsystem of a health service.

Even if the combination of structure, process and result data is required to obtain the best quality assessment strategies, it is understood that the relation between structure and care quality reveals its importance, considering that a good structure means sufficient resources and adequate system design<sup>(3)</sup>.

Based on the above and knowing that medication usage constitutes a subsystem in the hospital context, this study aims to: characterize the medication preparation structure in teaching hospitals regarding its physical environment, material and human resources; and identify the factors that interfere in care quality.

## METHODOLOGY

This is an exploratory and descriptive study, designed to attend the peculiarities of this research.

The investigation was carried out in the medical clinic area of two public hospitals in Recife, Brazil, between October and December 2004. Both institutions are related with teaching and research activities, because they develop medical, nursing and pharmacy residence programs. The sample consisted of 14 nurses (100%) in both hospitals. Secondary-level professionals represented 92% (34) and 76% (15) in the first and second institution, respectively. In the text, they are referred to as Hospital 1 and Hospital 2.

Data were collected after the approval of the Ethics Committee, using non-participant observation and interviews through structured scripts. Two kinds of structured instruments were elaborated for data collection: one observation script and one interview script. Results were organized and described as follows.

## RESULTS

In this study, medication is prepared in the nursing service room. This environment measures 14.8 m<sup>2</sup> in Hospital 1 and 12.3 m<sup>2</sup> in Hospital 2, and is located in a central position towards the nursing ward.

These rooms are artificially illuminated, protecting the environment against sunlight. Illumination was considered sufficient at Hospital 1 but insufficient at 2, taking into account that the ceiling was more than three meters high, with only two fluorescent lamps available. Ventilation is natural and occurs indirectly, since there are no windows in the rooms. However, in addition to natural ventilation, a fan on the ceiling offers artificial ventilation at Hospital 2.

Furniture found in the nursing services room is destined to store the hospital-medical materials and individual doses for medication preparation and administration. The study identified, at the institutions, cabinets with drawers, wall cabinets and balcony cabinets.

There are exclusive refrigerators to preserve medication. There are no norms available at the sector about the preservation of medication under refrigeration, such as those related to the conservation of parenteral solutions of large volume. Manuals with norms, routines and procedures related to the conservation and storage of psychotropics and narcotics were not available either, not even regarding medication preparation and administration.

Regarding the medication preparation site, the study hospitals offer stainless metal balconies, trays of several sizes and kidney basins. To support medication

preparation, there are sinks for hand washing with manual taps. These sinks are supplied with liquid soap and paper towels; 70% alcohol to disinfect medication bottles and ampoules of medication, trays and basins. To discard piercing-cutting material, there are appropriate descartex<sup>®</sup> containers.

The devices identified to support medication administration were infusion pumps. These have a standard model, registered at the Health Ministry, at both institutions. At Hospital 1, these pumps are stored by an equipment central, responsible for cleaning, periodical maintenance and disinfection, according to guidelines by the Hospital Infection Control Committee (HICC). This central has 271 infusion pumps available for the hospitalization units. At Hospital 2, four units of this device were found, with a standard model, which are available at the sector. The nursing professional is responsible for cleaning and disinfection. Maintenance is not performed periodically.

For oral medication preparation, Hospital 1 does not have a specific container available. Hospital 2, on the other hand, every day requests fifty small disposable cups, and also has a mortar to triturate medication for administration by nasogastric probe.

Regarding parenteral medication preparation, it was observed that different options of material to prepare small and large volumes of parenteral solutions were only available for syringes, venipuncture catheters and serum devices. There were only three options of hypodermic needle sizes and calibers (40x12; 25x7; 13x0, 45).

At Hospital 1, an adhesive label is required, to be filled out by the nurse to identify the medication. At Hospital 2, medication to be administered in syringes is identified with gummed tape, while marker pens are used to identify intravenous solutions of large volume and medication in disposable cups.

Medication for administration can be transported on trays or kidney basins especially destined for this purpose.

Professionals with higher education degrees are available to prepare the prescribed drugs. These are nurses who, among their attributions, must be qualified to execute this activity as well as to guide, train and supervise nursing technicians and auxiliaries to perform this task. We identified ten nurses (100%) at Hospital 1 and four (100%) at Hospital 2, who work 30 hours per week.

In the reality of Brazilian institutions, medication preparation and administration has been the responsibility of nursing technicians and auxiliaries.

The nursing professionals are distributed in shifts of 12 X 60 hours for the day and night period. At Hospital 1, in total, there are 34 nursing professionals, distributed as follows: 53% in the day shift and 47% in the night shift. Hospital 2 has 16 professionals, 50% in each shift. At these institutions, a majority of professionals are nursing auxiliaries.

These professionals have performed their functions at the medical clinics of both hospitals, which include medication preparation and administration, for more than five years. Regarding the handling of infusion pumps, used to administer medication, it was observed that, in Hospital 1, the auxiliaries from the day shift received more information from the nurses, while auxiliaries from both shifts received information from the nurse with continued education in Hospital 2.

## DISCUSSION

Environments for nursing activities are indispensable in health institutions. Over the years, medication preparation has been performed in the nursing service room which, due to its location next to the nursing station, receives the same denomination.

Current standards recommend one nursing station for every 30 beds, and a service room of at least 5.7 m<sup>2</sup> for every station<sup>(4)</sup>. The service rooms at the study hospitals exceeded these recommended dimensions.

Regarding the illumination of the nursing service room, it must be sufficient to facilitate the reading of the prescription and the preparation of the medication. Literature indicates that, when the source of illumination is natural, direct incidence of sunlight must be avoided, preventing deterioration of the drug<sup>(5)</sup>. The nursing service room is considered part of the environment that needs artificial illumination, especially at night. In cases of artificial illumination, the use of fluorescent lamps is recommended, in a quantity compatible with the dimensions of the room and activity performed, which must be calculated accordingly<sup>(5-6)</sup>. The illumination in Hospital 2 was considered insufficient.

The ventilation, when natural, must also be sufficient, avoiding both excessive heating and humidity. The nursing service room does not require specific temperature, humidity or air quality conditions. However, when artificial ventilation is needed,

acclimatization of the environment must be chosen. Therefore, the use of a ceiling fan, found at Hospital 2, is counter-indicated. According to the Determination by Collegiate Directory (RDC) n° 45, environments for medication preparation, especially small and large volumes of parenteral solutions, must be free of dust and particles<sup>(4-5)</sup>.

Tracing a parallel between the environmental conditions where all medication is prepared, especially small and large volumes of parenteral solutions, and the RDC n° 45 recommendation: *this environment should be of restricted access and exclusive use, free of dust, particles and protected against the entrance of insects and guaranteeing sterility of the medication*, it is perceived that the nursing service rooms, neither at the study hospitals nor at other Brazilian public and private hospitals, do not comply with these recommendations. Awareness should be raised among service managers to achieve compliance with this standard.

There is plenty of discussion about the conditions of medication preparation environments, regarding the sterility of the prepared medication. Some authors suggest that, to comply with legal recommendations<sup>(5)</sup>, parenteral solutions must be prepared under a laminar flow cabinet and, therefore, their preparation must be carried out by the hospital pharmacy in individual doses. On the other hand, it is known that medication preparation in these conditions raises costs, since it requires appropriate equipments and more personnel<sup>(6)</sup>.

Regarding the organization of the work space, it has been the nurse's duty to adequate furniture and equipments to the developed activities. Nurse leaders at their units must study the dimensions of cabinets and drawers designated for consumption material, so as to give professionals fast and ergonomic access.

The existence of nursing service organization standards guides the activities. These standards determine activities or guide the description of administrative or technical actions in the scope of nursing activities<sup>(7)</sup>. In this perspective, the study institutions are not organized in terms of medication conservation standards, neither under refrigeration nor in ambient temperature.

One of the suggestions presented is that the services can choose to execute standards and routines adjusted to the actual situation of the employees who are in charge of activities<sup>(7)</sup>. In this sense, the service heads at the study hospitals must use these

instruments to assure the uniformity of medication procedures, ranging from storage and conservation to preparation and administration.

Concerning the availability of trays and basins to support medication preparation and transportation, it is necessary to estimate the number of times these materials are used during the day must be estimated<sup>(8)</sup>. The reason is that these materials seem insufficient at the units, considering that they are used for other nursing procedures.

The infusion pumps identified at the study sites are in conformity with legislation and the available quantity attends to the sector's needs.

With regards to material and equipment, their availability in due time and quantity allow for activities to be performed without any harm to the patient.

To prepare oral medication, literature indicates the use of disposable cups, especially to administer syrups, suspensions and emulsions. Likewise, the use of a mortar is indicated to triturate drugs for administration by nasogastric or nasointestinal probes<sup>(9-10)</sup>.

Only Hospital 2 has disposable cups available for oral medication administration and a mortar to triturate pills. At Hospital 1, syringes are used to measure, dissolve and transport liquid drugs. This form of storage favors errors, as it facilitates a change in administration route.

Another aspect in the material available for medication preparation was standardization. The standardization of material allows for good economic and technical results and mainly supports the material prevision process by reducing the number of items, turning material organization and control more efficient<sup>(11)</sup>. It is agreed that standardization simplifies and reduces waste. On the other hand, it is important for standardized elements to be carefully analyzed, so as not to cause any risk to the patient.

In this sense, the availability of hypodermic needles and their respective calibers stands out. Two caliber options are offered at Hospital 1 and three at Hospital 2. In this situation, one technical aspect seems to have been ignored, which is extremely important for intramuscular medication administration, i.e. evaluating the thickness of the patient's cutaneous tissue in relation to the type of needle used. Although the number of intramuscular medication prescriptions is low, literature recommends that, to choose the needle, besides subcutaneous thickness, the type of solution to be administered should be observed<sup>(10,12)</sup>.

Among other considerations, the non-observance of this aspect in choosing syringes and needles constitutes a potential complication in intramuscular injections<sup>(9-10,12)</sup>. Therefore, a review of this item is recommended, considering variations in the age range and physical complexion of patients attended at medical clinics.

Scalp (butterfly) devices and catheters for venipuncture (*jelco/abbocath*) are available in several calibers, allowing for a choice based on an evaluation of the patient's venous system.

To identify the medication to be administered, it is the institution's role to determine and attend this safety need in medication therapy. For this purpose, adhesive tape is indicated<sup>(9)</sup>. In this case, either gummed tape or marker pens can be used, according to institutional standards.

To analyze the adequacy of the nursing staff, some requirements are important, such as the adopted calculation method and the percentage of professionals, according to the patients' classification system. In terms of staff quantity, we found the most critical personnel situation at Hospital 2.

What staff dimensioning in teaching hospitals is concerned, it must also be considered that the transit of faculty and students interfere with care dynamics. This requires attention in calculations of professional absence rates<sup>(13)</sup>.

In terms of public hospitals, the policy regarding the admission of human resource admission policies are linked up with higher political decision levels, as this process occurs by means of public exams or through temporary contracts by the State Health Secretary.

Professional training has been the most effective way to prepare them to cope with technological and scientific changes that are invading

the hospital institutions<sup>(14)</sup>. In medication therapy, professional education must address not only innovations in terms of medication administration support equipment, in this case several models of infusion pumps. Updates about medication groups, their effects and possible reactions are essential to monitor patients receiving medication therapy. are institutionseen the most effective way to prepare them to the coping of technological and scie.

## FINAL CONSIDERATIONS

At the end of this study, we could characterize the medication preparation structure and the multiple related factors that interfere with the quality of medication therapy at the study institutions. The medication preparation environment did not comply with current legislation, requiring immediate modifications. The availability of material resources for medication preparation also needs to be revised in terms of quantity of syringes and mainly hypodermic needles standardized by the institutions. Under the current circumstances, these offer risks to the patients.

The results show that nursing professionals do not receive information about the systematic handling of infusion pumps and medication. Allied with the lack of standards, routines and procedures related to medication conservation and storage, this threatens care quality.

Finally, the structure of the medication system is essential to obtain a safe and effective medication therapy. The factors appointed in this study interfere with the medication administration process. Consequently, modifications are required to achieve high-quality medication therapy.

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